

US EPA ARCHIVE DOCUMENT

National Listing of Fish Advisories NEWSLETTER

Recent Advisory News

Fishermen age 50+ to take part in a fish consumption survey in Wisconsin

The Wisconsin Department of Health Services (DHS) is conducting an online survey of fishermen over the age of 50 to find out where they fish, what they eat and where they get information about safe fish consumption. Men in this age group eat more sport-caught fish than any other age group and may be exposed to higher levels of contamination than the general population. The DHS hopes to learn the best way to inform this population on how to reduce their exposure to environmental contaminants while they continue to include sport-caught fish in their diet. The survey will be available through 2013 and so far, more than 2,500 fishermen have participated. To participate in the survey follow this link: <https://study.uwsc.wisc.edu/anglers/>. More information on Wisconsin fish advisories can be found at: <http://www.dhs.wisconsin.gov/eh/fish/>.

Link to original article: www.dhs.wisconsin.gov/News/PressReleases/2013/051413.htm

Source: Wisconsin Department of Health Services. May 14, 2013.

New genetic research on white perch in Delaware Bay has implications for consumption advisories

Researchers in the College of Earth, Ocean and Environment at the University of Delaware are using genetic techniques to identify distinct subpopulations of white perch in the Delaware Bay. It is thought that toxin levels may vary in these subpopulations depending on where they travel. Their results have shown that population structure is geographically linked and by looking at the patterns and differences between the samples, they may be able to infer migration pathways between groups of fish. Natural resource managers may be interested in knowing how fish differ in terms of toxicity. The Delaware Department of Natural Resources and Environmental Control (DNREC) have issued fish advisories that restrict consumption of all white perch caught near the Chesapeake and Delaware Canal. It is important to note that this work will not rede-



fine consumption advisories issued by DNREC, but researchers hope that incorporating genetic research into consumption advisories will allow advisory program managers to make more specific advisories that might allow consumption of some subpopulations of white perch.

Link to original article: <http://www.udel.edu/udaily/2013/may/white-perch-052813.html>

Source: University of Delaware. Finding a Safe Perch. May 28, 2013.

Fish consumption advisories for Texas coastal waters

The Texas Department of State Health Services (DSHS) and the Corpus Christi-Nueces County Health District have issued fish consumption advisories for fish caught in the northwestern Gulf of Mexico. The advisories were issued after recent test results showed mercury levels of 0.7 mg/kg, which exceed the DSHS health guidelines. The advisory restricts all consumption for women of childbearing age and children under the age of 12 and makes meal recommendations for women past childbearing age and adult men. For a map of the advisory area and more information on Texas fish advisories go to: <http://www.dshs.state.tx.us/seafood/>.

Link to original article: <http://www.cctexas.com/news-center/health-district-reports-state-has-issued-fish-consumption-advisory-for-texas-coastal-waters>

Source: Corpus Christi-Nueces County Health District. May 10, 2013.



Recent Publications

Please note: The following abstracts are reprinted verbatim unless otherwise noted. Titles and citations (only) are listed for publications that are copyright protected.

Relationship between mercury levels in hair and fish consumption in a population living near a hydroelectric tropical dam

In the present study, total mercury (T-Hg) concentrations were assessed in human hair samples ($n = 76$) and fish muscle ($n = 33$) collected at Urrá dam, upstream Sinú river, northwestern Colombia. Based on interviews with study participants, weekly intakes of total mercury (WIT-Hg) and methylmercury (WIMeHg) by fish consumption were also estimated. T-Hg concentrations in hair samples ranged from 0.40 to 24.56 µg/g dw. The highest concentrations were recorded in children (CH) (2-15 years old, $n = 24$) with significant differences ($p < 0.05$) with respect to women of childbearing age (WCHA) (16-49 years old, $n = 29$) and the rest of the population (RP) ($n = 23$), which were not significantly different. The highest T-Hg concentrations in muscle tissue were recorded in the carnivorous fish (0.65-2.25 µg/g wet weight, ww), with significant differences ($p < 0.05$) compared to non-carnivorous fish (0.16-0.54 µg/g ww). WIT-Hg recorded the highest values in CH (2.18-50.41 µg/kg/week), with significant differences ($p < 0.05$) with respect to WCHA (2.02-23.54 µg/kg/week) and RP (1.09-24.71 µg/kg/week), which were not significantly different. Correlation analysis showed a significant relationship between weekly fish consumption and hair T-Hg in CH ($r = 0.37$, $p < 0.05$) and WCHA ($r = 0.44$, $p < 0.05$). This association was also observed with the number of days per week with fish consumption in CH ($r = 0.37$, $p < 0.05$) and WCHA ($r = 0.45$, $p < 0.05$). These results suggest that Hg exposure in people inhabiting the Urrá dam should be carefully monitored, particularly in vulnerable groups such as CH and WCHA.

Source: Marrugo-Negrete, J. I., J. A. Ruiz-Guzmán, et al. (2013). "Relationship between mercury levels in hair and fish consumption in a population living near a hydroelectric tropical dam." *Biol Trace Elem Res* 151(2): 187-194.

A pilot randomized controlled trial to promote healthful fish consumption during pregnancy: The food for thought study

BACKGROUND: Nutritionists advise pregnant women to eat fish to obtain adequate docosahexaenoic acid (DHA), an essential nutrient important for optimal brain development. However, concern exists that this advice will lead to excess intake of

methylmercury, a developmental neurotoxicant. **OBJECTIVE:** Conduct a pilot intervention to increase consumption of high-DHA, low-mercury fish in pregnancy. **METHODS:** In April-October 2010 we recruited 61 women in the greater Boston, MA area at 12-22 weeks gestation who consumed ≤ 2 fish servings/month, and obtained outcome data from 55. We randomized participants to 3 arms: Advice to consume low-mercury/high-DHA fish ($n=18$); Advice + grocery store gift cards (GC) to purchase fish ($n=17$); or Control messages ($n=20$). At baseline and 12-week follow-up we estimated intake of fish, DHA and mercury using a 1-month fish intake food frequency questionnaire, and measured plasma DHA and blood and hair total mercury. **RESULTS:** Baseline characteristics and mean (range) intakes of fish [21 (0-125) g/day] and DHA from fish [91 (0-554) mg/d] were similar in all 3 arms. From baseline to follow-up, intake of fish [Advice: 12 g/day (95% CI: -5, 29), Advice+GC: 22 g/day (5, 39)] and DHA [Advice: 70 mg/d (3, 137), Advice+GC: 161 mg/d (93, 229)] increased in both intervention groups, compared with controls. At follow-up, no control women consumed ≥ 200 mg/d of DHA from fish, compared with 33% in the Advice arm ($p=0.005$) and 53% in the Advice+GC arm ($p=0.0002$). We did not detect any differences in mercury intake or in biomarker levels of mercury and DHA between groups. **CONCLUSIONS:** An educational intervention increased consumption of fish and DHA but not mercury. Future studies are needed to determine intervention effects on pregnancy and childhood health outcomes.

Source: Oken, E., L. B. Guthrie, et al. (2013). "A pilot randomized controlled trial to promote healthful fish consumption during pregnancy: The food for thought study." *Nutrition Journal* 12(33).

Stakeholder participation in research design and decisions: Scientists, fishers, and mercury in saltwater fish

Individuals who fish and eat self-caught fish make decisions about where to fish, the type to eat, and the quantity to eat. Federal and state agencies often issue consumption advisories for some fish with high mercury (Hg) concentrations, but seldom provide either the actual metal levels to the general public, or identify the fish that have low contaminant levels. Community participatory research is of growing importance in defining, studying, and resolving complex exposure and risk issues, and this paper is at the intersection of traditional stakeholder approaches and community-based participatory research. The objective of this paper is to describe the process whereby stakeholders

Conferences

International Conference on Mercury as a Global Pollutant

July 28-August 2, 2013, Edinburgh, Scotland

<http://www.mercury2013.com/>

International Society of Exposure Science (ISES)-23rd Annual Meeting

August 20-23, 2013, Basel, Switzerland

http://www.isesweb.org/Meetings/mtgs_fut.htm

American Fisheries Society 143rd Annual Meeting

September 8-12, 2013, Little Rock, Arkansas

<http://afs2013.com/>

The Society of Environmental Toxicology and Chemistry (SETAC) North America 34th Annual Meeting

November 17-21, 2013, Nashville, Tennessee

http://www.setac.org/events/event_details.asp?id=244644

(fishers), were involved in directing and refining research questions to address their particular informational needs about mercury levels in fish, potential risks, and methods to maintain health, by balancing the risks and benefits of fish consumption. A range of stakeholders, mainly individual fishers, fishing organizations, and other scientists, were involved at nearly every stage. Community participants influenced many aspects of the design and implementation of the research, in the determination of which fish species to sample, in the collection of the samples, and in the final analyses and synthesis, as well as the communication of results and implications of the research through their fishing club publications, talks and gatherings. By involving the most interested and affected communities, the data and conclusions are relevant to their needs because the fish examined were those they ate and wanted information about, and directly address concerns about the risk from consuming self-caught fish. Although mercury levels in fish presumed to be high in mercury are known, little information was available to the fishermen on mercury levels in fish that were low and thus provided little risk to their families. While community participatory research is more time-consuming and expensive than traditional scientific research, both the process and results are better scientifically in terms of community relevance.

Source: Burger, J., M. Gochfeld, et al. (2013). "Stakeholder participation in research design and decisions: Scientists, fishers, and mercury in saltwater fish." *EcoHealth* 10(1): 21-30.

Consumption of seafood, serum liver enzymes, and blood levels of PFOS and PFOA in the Japanese population

Objective: Perfluorooctanesulfonate (PFOS) and perfluorooctanoate (PFOA) have been shown to accumulate in the human body. The purpose of the present study was to examine the factors associated with the blood levels of PFOS and PFOA. Methods: A cross-sectional study was performed on 307 men and 301 women (aged 16-76 years) living in 15 prefectures in Japan. Blood levels of PFOS and PFOA were measured by liquid chromatography-mass spectrometry. Hepatic enzymes (γ -GTP, GOT, and GPT) and ω -3 polyunsaturated fatty acids (DHA and EPA) levels in serum were also measured. Associations between the levels of PFOS and PFOA in blood and the intake frequency of 41 kinds of dishes, foods and beverages and the serum levels of liver enzymes and ω -3 polyunsaturated fatty acids were examined using rank correlations. Results: Frequency of intake of boiled fish in broth, sliced raw fish and coastal fish showed significant positive correlations with

PFOS concentrations in blood after adjustments for potential confounders. Serum levels of GOT, GPT, DHA and EPA showed significant positive correlations with PFOS and PFOA in blood. There was also a significant regional difference in the blood levels of PFOS and PFOA, with medians being highest in the Tokai/Hokuriku/Kinki region. Conclusion: These findings suggest that the concentrations of PFOS in blood were mainly associated with fish consumption and that the levels of PFOS and PFOA were mainly associated with the serum levels of liver enzymes in Japanese populations. Further investigations are required to clarify the reason for the regional differences in blood levels of PFOS and PFOA in Japan.

Source: Yamaguchi, M., K. Arisawa, et al. (2013). "Consumption of seafood, serum liver enzymes, and blood levels of PFOS and PFOA in the Japanese population." *Journal of Occupational Health*. Epub ahead of print.

Omega-3 fatty acids from fish, other nutrient intake, and lifestyle factors: Exploring the relationship in children

The omega-3 fatty acids found mostly in seafood are essential nutrients that may help prevent or control a number of diseases; however, the evidence for this is not conclusive. The positive effects may be because of other dietary and lifestyle factors. Therefore, we investigated the association



between fish intake and other nutrition indicators and lifestyle and demographic factors among children. The study employed grade-4 student data of the 2000-2004 Hawaii Nutrition Education Needs Assessment Survey. In a sample 666 children (mean age = 9.57 ± 0.06 years, 55.6% female, 62.4% Asian/Pacific Islander), analysis indicated that fish consumption is positively associated with healthy lifestyle indicators, such as physical activity and a healthy body mass index. Fish consumption is also positively associated with protein and kilocalories intake but not with fruits and vegetables consumption. Findings suggest that the positive health behaviors linked to fish consumption may lie more in physical activity than in diet behaviors. Given that fish consumption is important for children, interventions promoting fish consumption in a balanced diet with fruit and vegetable, as well as other positive lifestyle behaviors are warranted.

Source: Chung, H. V., C. S. Iversen, et al. (2013). "Omega-3 fatty acids from fish, other nutrient intake, and lifestyle factors: Exploring the relationship in children." *Asia Pacific Journal of Public Health* Epub ahead of print.

Experimental and natural warming elevates mercury concentrations in estuarine fish

Marine food webs are the most important link between the global contaminant, methylmercury (MeHg), and human exposure through consumption of seafood. Warming temperatures may increase human exposure to MeHg, a potent neurotoxin, by increasing MeHg production as well as bioaccumulation and trophic transfer through marine food webs. Studies of the effects of temperature on MeHg bioaccumulation are rare and no study has specifically related temperature to MeHg fate by linking laboratory experiments with natural field manipulations in coastal ecosystems. We performed laboratory and field experiments on MeHg accumulation under varying temperature regimes using the killifish, *Fundulus heteroclitus*. Temperature treatments were established in salt pools on a coastal salt marsh using a natural temperature gradient where killifish fed on natural food sources. Temperatures were manipulated across a wider range in laboratory experiments with killifish exposed to MeHg enriched food. In both laboratory microcosms and field mesocosms, MeHg concentrations in killifish significantly increased at elevated temperatures. Moreover, in field experiments, other ancillary variables (salinity, MeHg in sediment, etc.) did not relate to MeHg bioaccumulation. Modeling of laboratory experimental results suggested increases in metabolic rate as a driving factor. The elevated temperatures we tested are consistent with predict-

ed trends in climate warming, and indicate that in the absence of confounding factors, warmer sea surface temperatures could result in greater bioaccumulation of MeHg in fish, and consequently, increased human exposure.

Source: Dijkstra, J. A., K. L. Buckman, et al. (2013). "Experimental and natural warming elevates mercury concentrations in estuarine fish." *PLoS One* 8(3).

Dietary advice on Inuit traditional food use needs to balance benefits and risks of mercury, selenium, and n3 fatty acids

Elevated concentrations of mercury (Hg) are commonly found in the traditional foods, including fish and marine mammals, of Inuit living in Canada's Arctic. As a result, Inuit often have higher dietary Hg intake and elevated Hg blood concentrations. However, these same traditional foods are excellent sources of essential nutrients. The goals of this study were 1) to identify the traditional food sources of Hg exposure for Inuit, 2) to estimate the percentage of Inuit who meet specific nutrient Dietary Reference Intakes and/or exceed the Toxicological Reference Values (TRVs), and 3) to evaluate options that maximize nutrient intake while minimizing contaminant exposure. A participatory cross-sectional survey was designed in consultation with Inuit in 3 Canadian Arctic jurisdictions (Nunatsiavut, Nunavut, and the Inuvialuit Settlement Region). Estimated intakes for EPA (20:5n3) and DHA (22:6n3) met suggested dietary targets, and estimated selenium (Se) intake fell within the Acceptable Range of Oral Intake. Estimated intakes of Hg ($r_s = 0.41$, $P < 0.001$), Se ($r_s = 0.44$, $P < 0.001$), EPA ($r_s = 0.32$, $P < 0.001$), and DHA ($r_s = 0.28$, $P < 0.001$) were correlated with their respective blood concentrations. Mean estimated Hg intake ($7.9 \mu\text{g} \cdot \text{kg}^{-1} \cdot \text{wk}^{-1}$) exceeded the TRV of $5.0 \mu\text{g} \cdot \text{kg}^{-1} \cdot \text{wk}^{-1}$, with 35% of the population above this guideline. Because the estimated intakes of each of the nutrients were strongly correlated (Se: $r_s = 0.92$, $P < 0.001$; EPA: $r_s = 0.82$, $P < 0.001$; DHA: $r_s = 0.81$, $P < 0.001$) with estimated Hg intake, efforts to decrease Hg exposure must emphasize the overall healthfulness of traditional foods and be designed to prevent concomitant harm to the nutrient intakes of Inuit.

Source: Laird, B. D., A. B. Goncharov, et al. (2013). "Dietary advice on Inuit traditional food use needs to balance benefits and risks of mercury, selenium, and n3 fatty acids." *The Journal of Nutrition* 143(6): 923-930.

Ecotoxicity and risk to human fish consumers of polychlorinated biphenyls in fish near the Hanford Site (USA)

Source: Delistraty, D. (2013). "Ecotoxicity and risk to human fish consumers of polychlorinated biphenyls in fish near the Hanford Site (USA)." *Science of the Total Environment* 445-446: 14-2.

Assessment of heavy metals in tilapia fish (*Oreochromis niloticus*) from the Langat River and Engineering Lake in Bangi, Malaysia, and evaluation of health risk from tilapia consumption

Source: Tawee, A., M. Shuhaimi-Othman, et al. (2013). "Assessment of heavy metals in tilapia fish (*Oreochromis niloticus*) from the Langat River and Engineering Lake in Bangi, Malaysia, and evaluation of health risk from tilapia consumption." *Ecotoxicology and Environmental Safety*.

Increased consumption of salmon during pregnancy partly prevents the decline of some plasma essential amino acid concentrations in pregnant women

Source: Rossary, A., M.-C. Farges, et al. (2013). "Increased consumption of salmon during pregnancy partly prevents the decline of some plasma essential amino acid concentrations in pregnant women." *Clinical Nutrition* Epub ahead of print.

Selenium and mercury in widely consumed seafood from South Atlantic Ocean

Source: Kehrig, H. A., T. G. Seixas, et al. (2013). "Selenium and mercury in widely consumed seafood from South Atlantic Ocean." *Ecotoxicology and Environmental Safety*. Epub ahead of print.

Risk assessments of human exposure to bioaccessible phthalate esters through market fish consumption

Source: Cheng, Z., X.-P. Nie, et al. (2013). "Risk assessments of human exposure to bioaccessible phthalate esters through market fish consumption." *Environment International* 57-58: 75-80.

Monitoring programme on toxic metal in bluefish (*Pomatomus saltatrix*), anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*) from Istanbul, Turkey: Levels and estimated weekly intake

Source: Özden, Ö. (2013). "Monitoring programme on toxic metal in bluefish (*Pomatomus saltatrix*), anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*) from Istanbul, Turkey: Levels and estimated weekly intake." *Bulletin of Environmental Contamination and Toxicology* 90(5): 542-551.

Mercury as a global pollutant: Sources, pathways, and effects

Source: Driscoll, C. T., R. P. Mason, et al. (2013). "Mercury as a global pollutant: Sources, pathways, and effects." *Environ Sci Technol* 47(10): 4967-4983.

Plasma mercury levels in Hong Kong residents: In relation to fish consumption

Source: Liang, P., Y.-Y. Qin, et al. (2013). "Plasma mercury levels in Hong Kong residents: In relation to fish consumption." *Science of the Total Environment*. Epub ahead of print.

Need for improved risk communication of fish consumption advisories to protect maternal and child health: Influence of primary informants

Source: Leprevost, C., K. M. Gray, et al. (2013). "Need for improved risk communication of fish consumption advisories to protect maternal and child health: Influence of primary informants." *Int J Environ Res Public Health* 10(5): 1720-1734.

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Additional Information

For more information about specific advisories within a state, contact the appropriate state agency listed on EPA's NLFA website at <http://fishadvisoryonline.epa.gov/Contacts.aspx>